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THE ISRAELI MARKET FOR CULTURED GILTHEAD SEA BREAM (*SPARUS AURATA*)

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Abstract

With average annual growth at 38%, sea bream production is the main growth factor in Israel's fisheries industry. It is estimated that cultured sea bream constituted over 10% of the volume and 20% of the value of domestic fisheries in 2000. Per capita consumption of sea bream grew from 0.11 kg in 1995 to an estimated 0.39 kg in 2000. Rapid industry development lowered market prices but, in general, farm-gate prices in Israel are higher than in major Mediterranean producers. Fluctuations in sea bream prices reflect fluctuating demand, but the percentage that sales have increased is greater than the percentage that prices have decreased. Cultured sea bream in Israel lacks competition from wild or imported sources. Increasing supplies of sea bream will come from the local mariculture industry, but growth is slowing and several constraints must be overcome. Intensive recirculating aquaculture systems may enhance inland marine farm production. The sea bream market in Israel has not reached saturation level, as indicated by consumption which has increased without significant marketing efforts. Demand could increase to 4,500 tons (0.7 kg per capita) by 2005. Whether this forecast is overly optimistic or not, it reveals potential for mariculture development.

General Trends of Fish Supply and Consumption in Israel

With per capita fish consumption at 10.5 kg per year (Snovsky and Shapiro, 2000), Israel has one of the highest levels in the Middle East (FAO, 2000). Local fish production comes from aquaculture (freshwater and marine) and capture fisheries in the Mediterranean and Lake

Kinneret (Sea of Galilee), but aquaculture largely dominates the domestic fisheries output (Fig. 1). In 1999, freshwater and marine fish farms supplied 76% of the total domestic fisheries, in what is probably the world's highest national aquaculture contribution to domestic aquatic production (for other top 14 countries,

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Fig. 1. Fish consumption in Israel by source in 1999 (Snovsky and Shapiro, 2000).

see Rana and Immink, 1998). Despite this remarkable record, local production has never been able to supply the local demand and, as a result, Israel has a chronic deficit in its fish trade balance. In 1999, 62% of the local demand was met by imported fish supplies, depicting an unchanged trend over the last decade of a 60:40 ratio between imports and domestic production (Mires, 1997).

Fish consumers in Israel have traditionally preferred fresh fish, and 90% of the local production is consumed in this form. In contrast, fish imports are mainly frozen. They consist of species not produced by the local industry and their principal sources are marine stocks from the Atlantic Ocean (Mires, 1997). In the fresh fish sector there has been a marked increase in the demand for marine fish. From 1994 to 1999, per capita consumption of these products rose 89% from 0.53 kg to 1.0 kg/year (Snovsky and Shapiro, 2000), largely attributed to the growth of the domestic mariculture supply (0.40 kg per capita in 1999).

Mariculture is relatively new to the local aquaculture industry. It developed only during the last decade and rapidly. Production of marine fish grew from 400 tons in 1994 to an estimated 2,700 tons in 2000 (Table 1), an extraordinary average growth rate of 38% per annum that established this sector as the main growth factor in fisheries supply in Israel. The relative contribution of mariculture to the total domestic fish production has also increased. In 1999, mariculture represented close to 10% in volume and over 20% in gross value of all domestic fisheries.

Sea Bream Marketing Characteristics

Gilthead sea bream (*Sparus aurata*) is among the most sought-after fish in the Mediterranean basin. In Israel it is widely accepted by different sectors of the population and consumers consider it a high quality marine fish. Despite being prized on the gourmet market, it has lost its luxury image and become a commodity item affordable by the average household. In 1999 sea bream consumption ranked sixth in volume, amongst all marketed fish.

Sea bream sales strongly focus on the whole (round) fresh-chilled product. Hotels and restaurants are the main consumers, representing more than 60% of the total consumption (major wholesaler, pers. comm.). Most of the rest is sold to retail stores. Frozen products and ready-to-cook items represent a minor undeveloped market fraction that reaches consumers through supermarket chains. Unlike in Europe, where supermarkets play a major role in the fish trade, efforts to develop fresh fish sales through these channels in Israel have not produced the expected results.

Sea bream is marketed in five categories of individual weight: tiny (<300 g), small (300-400 g), medium (400-500 g), large (500-600 g) and extra-large (>600 g). Fish farms usually grow the fish to the medium size, which is the "portion" size generally offered by restaurants. Smaller fish are popular with fishmongers and extra-large fish are often hard to sell. The demand for sea bream is fairly stable year-round except for two peaks which occur during the Passover and Jewish New Year holidays (when it is traditional to eat fish).

Table 1. Mariculture production in Israel.¹

Year	Yield (tons)	% change from previous year	Value (thousand US\$)	% change from previous year	Contribution to the total domestic fisheries	
					Volume (%)	Value (%)
1994	400	N/A	2,697	N/A	2.1%	3.6%
1995	650	62.5%	4,918	82.4%	2.9%	5.3%
1996	963	48.2%	7,250	47.4%	4.2%	7.6%
1997	1,593	65.4%	12,789	76.4%	6.8%	13.1%
1998	1,902	19.4%	15,016	17.4%	7.7%	16.0%
1999	2,408	26.6%	19,001	26.5%	9.8%	22.3%
2000 ²	2,700	12.1%			16%	

N/A = data not available

¹ Source: Snovsky and Shapiro, 2000.² Data for 2000 is estimated.

Sea Bream Supply and Consumption

The decline of the Mediterranean wild sea bream fisheries and the rapid development of mariculture enhanced prospects for development of the cultured sea bream market.

During the 1990s, sea bream dominated mariculture production (approximately 90%). The remainder of mariculture production was sea bass (*Dicentrarchus labrax*), red drum (*Sciaenops ocellatus*) and hybrid striped bass (*Morone chrysops* x *M. saxatilis*). Today sea bream represents Israel's third most important cultured species, after carp and tilapia. The spectacular success of the Israeli mariculture industry is mainly the result of the production of two cage farms in the Gulf of Eilat (Aqaba) in the Red Sea.

As there are no imports or exports of sea bream in Israel, all domestic production is consumed locally. Not only has supplies from mariculture increased, but also per capita consumption has increased some 255% from 0.11 kg in 1995 to an estimated 0.39 kg in 2000 (Fig. 2).

Market Prices and Demand for Sea Bream

Wholesale market prices of sea bream in Israel are mainly affected by fish size and the warm summer season. The increased demand over the holidays does not significantly increase sea bream prices, in contrast to European markets where seafood prices rise during the Easter and Christmas holidays. Also in contrast to most European markets where extra-large fish (800-1000 g), usually used for filleting, fetch a significantly higher price per kg (Globefish, 1997-2001), in Israel, medium-sized fish generally fetch the best price.

Like in Europe, rapid mariculture development led to lower sea bream prices (Fig. 3). Nevertheless, farm-gate prices in Israel are higher than those received by major Mediterranean producers and, therefore, the domestic market remains the main target for local producers.

If the price decay relationship with volume remains the same, further increases of sea bream supply are bound to exert downward pressure on price (a decline of \$0.19/kg for

Fig. 2. The per capita consumption of sea bream in Israel (Snovsky and Shapiro, 2000; CBS, 2001).

every ton/y increase, Fig. 4). However, during some consecutive years, 1994-1995, 1996-1997 and 1999-2000, wholesale prices remained fairly stable despite the increased quantities consumed. Considering that there have been no significant changes in the marketing policies of sea bream or seafood market characteristics during these periods, the trend in sea bream demand suggests continuing positive changes in consumer preference (i.e. increasing per capita consumption).

Two elasticity analyses were performed to evaluate price response to changes in demand (price elasticity) and demand response to changes in buyer's income (income elasticity). Both elasticities were calculated by direct methods (no other variables were included) according to equations 1 and 2.

$$EP = \frac{(Q_n - Q_{n-1}) / Q_{n-1}}{(P_n - P_{n-1}) / P_{n-1}} \quad \text{Eq. 1}$$

where EP = price elasticity, Q_n = volume sold in current year (tons), Q_{n-1} = volume sold in previous year (tons), P_n = price in current year (US\$/kg), P_{n-1} = price in previous year (US\$/kg).

$$EI = \frac{(Q'_n - Q'_{n-1}) / Q'_{n-1}}{(I_n - I_{n-1}) / I_{n-1}} \quad \text{Eq. 2}$$

where EI = income elasticity, Q'_n = per capita demand in current year (kg/capita), Q'_{n-1} = per capita demand in previous year (kg/capita), I_n = income per capita in current year (US\$/capita), I_{n-1} = income per capita in previous year (US\$/capita). Disposable income is an approximate amount of the GNI (Gross National Income; World Bank, 2001).

Price elasticity of sea bream denotes an elastic demand, where the percentage that sales increased was more than the percentage that prices declined (negative EP). However, no correlation was found between the percentage of change in sales and the percentage of change in price decline (Fig. 5). This finding might be related to increasing consumer preference for sea bream.

The income elasticity analysis showed that the per capita demand for sea bream rose despite positive and negative changes in per capita income (Fig. 6). Although not conclusive, sea bream demand does not appear to be related to disposable income.

Fig. 3. Israeli cultured sea bream production and wholesale prices in Israel and Europe (Snovsky and Shapiro, 2000; FEAP, 2001).

Fig. 4. Price/demand curve of the Israeli sea bream market.

Retail prices of sea bream vary greatly by region. In 2000-2001, they ranged from US\$8/kg in Eilat (where Value Added Tax is not charged) to US\$12/kg (including the 17% VAT).

Competition

Because of high customs charges on imports to Israel, competition from European producers of sea bream seems unlikely. Even at a low European FOB price of US\$4/kg (Fig. 7), additional costs for freight, taxes, and a profit margin, will result in little or no competition.

In today's fish restaurant market segment, marine fish seems to be the first choice of consumers. Popular cultured freshwater fish, such as tilapia (St. Peter's fish) or mullet, which are sold at nearly half the wholesale price of sea bream, appear at practically the same price as sea bream on restaurant menus. This restaurant policy encourages consumption of sea bream (a more expensive product is offered at the same price as the less expensive), establishing consumer preference for sea bream and diminishing competition from freshwater species.

Competition from other fresh marine fish is sporadic. Current Mediterranean fisheries are characterized mainly by catches of sardines, other low-cost pelagics and mullets (Snovsky and Shapiro, 2000). Thus, supply of competitive marine fish is seasonal and limited in volume. The amounts of substitute species produced by mariculture, such as sea bass, are still too small to influence sea bream prices or customer preferences.

In the fishmonger market segment, fresh sea bream has good demand. Reasons are its year-round availability, consistent quality standards regarding size uniformity, freshness and taste, and high gastronomic potential that suits a wide variety of cooking styles. Further increase in demand is believed to be a matter of price, which at present is higher than for other cultured fish.

In supermarkets, where sea bream is sold frozen (whole, gutted), the product lacks a competitive price and presentation. Other high value species such as salmon (3,000 tons estimated sales in 2000, Gueba, 2001), cod and sole are generally sold at lower retail prices. Regardless of the market price, product pre-

Fig. 5. Sea bream price responses to changes in sales volume in the Israeli market (price elasticity, EP).

sensation, mainly in the form of boneless fillets and steaks, favor these products.

Certainly, any kind of increased competition in the Israeli sea bream market may affect local producers. However, the most imminent danger to future development of the mariculture industry in Israel may be the conflict between aquaculturists and environmentalists. Like in Europe, such conflicts often prove more harmful to the industry than any change in the business environment (Dallimore, 2001; Roberts, 2001).

Prospects of Sea Bream Supply

In relation to the growing population, the growth of the local mariculture industry is declining and still has several constraints to overcome. In the Red Sea, farms are faced with environmental restrictions that limit feeding rates to current levels. In addition, recent growing pressure from environmental and tourist organizations may jeopardize the continuation of these operations. Among the farms on the Mediterranean coast, the major one (a

cage farm in Ashdod port) was temporarily put out of business after catastrophic losses caused by a winter storm. The rest of the coastal farms have enhanced their production only marginally.

Further development initiatives on the Mediterranean coast have been hindered by the facts that there are no protected sites available for coastal cage culture and the feasibility of offshore systems in exposed areas has yet to be proved. The scarcity and competition for lands on the Mediterranean and Red Sea coasts leave little hope for any significant future extensive inland fish farming. However, the implementation of improved technologies in the fields of nutrition (extrusion feed, high energy content), water recirculation, genetics (selection), disease control, seed quality and intensive farm management have contributed to a substantial reduction in water utilization and land requirements. If properly implemented, intensive recirculating aquaculture systems could enhance inland marine farm pro-

Fig. 6. Sea bream demand responses to changes in consumer income in the Israeli market (income elasticity, EI).

* Gross National Income; World Bank, 2001.

duction. At present, the National Center for Mariculture in Eilat operates an experimental semi-commercial scale recirculating facility (Mozes et al., 2001), which could lead to further commercial development of mariculture production in the southern Arava Valley, north of the Red Sea. Some trials are also being carried out to culture sea bream using heated sea water effluents from power plants and brackish geothermal waters in the Negev desert.

Conclusions

Unlike in Europe, where sea bream markets appear to be heading towards saturation (Ferlin and LaCroix, 2000), the saturation level of the Israeli market has not been reached. The potential probably stands at much higher levels than at present, since consumption has been increasing even without significant improvements in marketing strategies (without strong

media promotion, product diversification or development of new market segments).

According to the Department of Fisheries of Israel's Ministry of Agriculture (Horin et al., 2000), demand for seafood products in Israel in the coming years is expected to increase slightly (to approximately 12 kg per capita by 2005). Sea bream is probably among the fish species having good potential to fill the increased demand. This statement relates to the fact that for the last five years (1995-1999), sea bream consumption per capita grew an outstanding 255%, while total fish consumption per capita for the same period remained fairly stable (Snovsky and Shapiro, 2000). From 1995 to date, the Israeli market has been consuming all its sea bream supplies from mariculture at an average growth rate of 0.06 kg per capita per year. The optimistic continuation of this trend, coupled with positive changes in the pattern of fish consumption towards fresh marine

Fig. 7. Prices on the Italian market (Globefish, 1997-2001) for cultured sea bream, fresh-whole, 450-600 g. Italy, the major European market for sea bream, was established as an indicator of prices in the EU.

fish, could result in a domestic demand for sea bream of 4,500 tons (0.7 kg per capita) by the year 2005. Whether this forecast is optimistic or not, it certainly reveals a high potential for further mariculture development.

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